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EXAMINER	
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BEFORE THE BOARD OF PATENT APPEALS AND INTERFERENCES

Paper No. 20040409

Application Number: 10/053,748
Filing Date: January 18, 2002
Appellant(s): BARFORD, LEE A.

Michael Johnson
For Appellant

SUPPLEMENTAL EXAMINER'S ANSWER

This is in response to the appeal's reply brief filed January 12, 2005.

(1) Real Party in Interest

A statement identifying the real party in interest is contained in the brief.

(2) Related Appeals and Interferences

A statement identifying the related appeals and interferences which will directly affect or be directly affected by or have a bearing on the decision in the pending appeal is contained in the brief.

(3) Status of Claims

The statement of the status of the claims contained in the brief is correct.

(4) Status of Amendments After Final

The appellant's statement of the status of amendments after final rejection contained in the brief is correct.

(5) Summary of Invention

The summary of invention contained in the brief is correct.

(6) Issues

The appellant's statement of the issues in the brief is incorrect. The examiner ~~are~~ has withdrawn the rejection of claims 5, 7, 8, 10, 31, and 38 responsive to the appellant's brief. The following claims 1, 2, 3, 4, 6, 11, 32, 33, 34, and 35 ~~are~~ stand rejected under 35 U.S.C. 102(b) as being anticipate by Booth et al. (USP 5,922,079).

(7) Grouping of Claims

The rejection of claims 1, 2, 3, 4, 6, 11, 32, 33, 34, and 35 stand or fall together because appellant's brief does not include a statement that this grouping of claims does not stand or fall together and reasons in support thereof. See 37 CFR 1.192(c)(7).

(8) Claims Appealed

The copy of the appealed claims contained in the Appendix to the brief is correct.

(9) Prior Art of Record

5,922,079	Booth et al.	07-1999

(10) Grounds of Rejection

The following ground(s) of rejection are applicable to the appealed claims:

Claim Rejections - 35 USC § 102

1. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

2. Claims 1-4, 6, 11, and 32-35 are rejected under 35 U.S.C. 102(b) as being anticipate by Booth et al. (USP 5,922,079).

Regarding claim 1, Booth et al. teach an automated analysis and troubleshooting system is provided that identifies potential problems with the test suite, and also identifies probable modeling errors based on incorrect diagnoses (e.g. Col.5, lines 35-40), the method comprising step of evaluating a diagnostic efficacy of the test suite (e.g. Col.9, lines 14-15) using a probability of one or both of a correct diagnosis and incorrect diagnosis by the test suite (e.g. Col.11, lines 15-18, lines 27-29).

Regarding claim 32, Booth et al. teach a test system that that identifies potential problems with the test suite, and also identifies probable modeling

errors based on incorrect diagnoses comprising: a processor (e.g. Col.6, lines 66-67); a memory (e.g. Col.7, lines 52-55); and a computer program stored in the memory and executed by the processor, wherein the computer program comprises instructions that, when executed by the processor (e.g. Col.6, lines 61-65, Col.7, lines 10-18), implement evaluating the test suite (e.g. Col.9, lines 14-15) using a probability of one or both of a correct diagnosis and incorrect diagnosis to determine the efficacy (e.g. Col.11, lines 15-18, lines 27-29).

Regarding claims 2, 33, Booth et al. teach the evaluation comprises suggesting a test to add to the test suite to adjust an overall test coverage of the test suite (e.g. Col.6, lines 38-45, Col.11, lines 29-35).

Regarding claims 3, 35, Booth et al. teach suggesting a test comprises: creating a simulation database 124 of the test suite; determining a probability of a correct diagnosis (e.g. Col.6, lines 49-54) and a probability of an incorrect diagnosis for the test suite using the database (e.g. Col.9, lines 33-61); and creating a list of suggested tests from the determined probabilities (e.g. Col.10, line 66-Col.11, line 35).

Regarding claim 4, Booth et al. teach each suggested test on the list comprises test coverage (e.g. Col.11, lines 29-31).

Regarding claim 6, Booth et al. teach identifying a test to delete from the test suite (e.g. Col.10, line 66-Col.11, line 15), the deletable test having a minimal effect on an overall diagnostic efficacy of the test suite (e.g., if an incorrect diagnosis is made, the automated analysis system identifies ways of

changing the rank order of diagnoses, including coverages that can be reduced and identification of operation violations that can be eliminated, Abstract).

Regarding claims 11, 34, Booth et al. teach the method of evaluating a diagnostic efficacy of the test suite using a probability of a diagnosis (e.g. Col.11, lines 24-64); creating a simulation database 124 of the test suite (e.g. Col.6, lines 49-54); determining a probability of a correct diagnosis and a probability of an incorrect diagnosis for the test suite using the database (e.g. Col.11, lines 15-18, lines 27-29); using the determined a probability to evaluate the test suite (e.g. Col.9, lines 14-15).

Allowable Subject Matter

3. Claims 5, 7-10, 12-31, 36-37 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

The following is a statement of reasons for the indication of allowable subject matter:

Regarding claim 5, none of the prior art of record teaches or suggests the combination of a method of determining a revision of a test suite of a model-based diagnostic testing system, wherein the method comprising step of evaluating a diagnostic efficacy of the test suite using a probability of one or both of correct diagnosis and incorrect diagnosis by the test suite, wherein the evaluation comprises: suggesting a test to add to the test suite to adjust an overall test coverage of the test suite, wherein suggesting a test comprises: creating a simulation database of the test suite; determining a probability of a

correct diagnosis and a probability of an incorrect diagnosis for the test suite using the database; and creating a list of suggested tests from the determined probabilities; wherein the evaluation further comprises: identifying a test to delete from the test suite that comprises: determining a probability of a correct diagnosis for a modified test suite using the database, the modified test suite having a selected test removed from the test suite; computing an efficacy value associated with the selected test using the determined probabilities of a correct diagnosis for the test suite and the modified test suite; and generating a list of deletable tests and associated efficacy values. It is these limitations as they are claimed in the combination with other limitations of claim, which have not been found, taught or suggested in the prior art of record, that make these claims allowable over the prior art.

Regarding claim 7, none of the prior art of record teaches or suggests the combination of a method of determining a revision of a test suite of a model-based diagnostic testing system, wherein the method comprising step of evaluating a diagnostic efficacy of the test suite using a probability of one or both of correct diagnosis and incorrect diagnosis by the test suite, wherein the evaluation comprises identifying a test to delete from the test suite, the deletable test having a minimal effect on an overall diagnostic efficacy of the test suite, wherein identifying a test comprises: creating a simulation database of the test suite; determining a probability of a correct diagnosis for the test suite using the database; determining a probability of a correct diagnosis for a modified test suite using the database, wherein the modified test suite is the test suite having a

selected test removed; computing an efficacy value for the modified test suite using the determined probabilities; and generating a list of deletable tests using the computed efficacy values. It is these limitations as they are claimed in the combination with other limitations of claim, which have not been found, taught or suggested in the prior art of record, that make these claims allowable over the prior art.

Regarding claim 12, none of the prior art of record teaches or suggests the combination of a method of evaluating a diagnostic efficacy of a test suite of a model based diagnostic testing system, wherein the method comprising step of creating a simulation database of the test suite, wherein creating a simulation database comprises step of simulating an application of the test suite to a device under test, the device under test comprising one or more components; and recording a probable result of the application in the simulation database, the simulation database being represented by a table having a plurality of columns and a plurality of rows, the plurality of columns comprising a component pattern, a test result pattern, and a number of occurrences, wherein the component pattern encodes which component is good or bad, each component of the device under test being represented by a unique position number within the component pattern, wherein the test result pattern encodes which of the tests of the test suite failed or passed, each test in the test suite being represented by a unique position within the test result pattern, wherein the number of occurrences represents a number of times that a given combination of the component pattern and the test result pattern occurred during a simulation, the number of

occurrences being an integer greater than or equal to zero, and wherein each row of the plurality of rows corresponds to a different unique pattern of good and bad components. It is these limitations as they are claimed in the combination with other limitations of claim, which have not been found, taught or suggested in the prior art of record, that make these claims allowable over the prior art.

Regarding claim 31, none of the prior art of record teaches or suggests the combination of a method of evaluating a diagnostic efficacy of a test suite of a model based diagnostic testing system, wherein the method comprising step of creating a simulation database of the test suite, determining a probability of one or both of correct diagnosis and incorrect diagnosis by the test suite using the database, using the determined probability to evaluate the test suite; wherein the created simulation database comprises a Monte Carol simulation of the device under test model, the database having a set of entries, each entry having a field for a number-of-occurrences value, a field for a test result pattern, and a field for a component state pattern. It is these limitations as they are claimed in the combination with other limitations of claim, which have not been found, taught or suggested in the prior art of record, that make these claims allowable over the prior art.

Regarding claim 36, none of the prior art of record teaches or suggests the combination of a system that determines efficacy of a test suite of a model-based diagnostic testing system comprising: a processor; a memory; and a computer program stored in the memory and executed by the processor, wherein the computer program comprises instructions that, when executed by the

processor, implement evaluating the test suite using a probability of one or both of correct diagnosis and incorrect diagnosis by the test suite to determine the efficacy, wherein the instructions that evaluate the test suite further comprise: determining a probability of a correct diagnosis for a modified test suite using the database, the modified test suite having a selected test removed from the test suite; and wherein using the determined probability comprises: computing an efficacy value for the modified test suite using the determined probability of a correct diagnosis for both the test suite and the modified test suite; and generating a list of tests to delete from the test suite based on the computed efficacy value. It is these limitations as they are claimed in the combination with other limitations of claim, which have not been found, taught or suggested in the prior art of record, that make these claims allowable over the prior art.

(11) Response to Argument

A. The appellants have argued, regarding the 35 U.S.C. 102(b) rejection of claims 1, 2, 3, 4, 6, 11, 32, 33, 34, and 35 as anticipated by Booth et al. (US 5,922,079).

The rejection of claim 1

In response to Appellants' argument that "Booth et al. do not contain any teaching or suggestion evaluating a diagnostic efficacy of the test suite using a probability of one or both of a correct diagnosis and incorrect diagnosis by the test suite" (Appeal Brief, page 8, paragraph 5), the examiner disagrees. Booth et al. teach the test system 100, the model based diagnostic system 106, test suite

analysis 116 and model debug 120 are all typically computer or processor based. That is, software is executed by a processor within an automated test system or the test system is controlled by a separate computer. In general, the test suite analysis 116 and model debug 120 can be performed by a processor or computer used for the test system 100 or used for the model based diagnostic system 106. Alternatively, test suite analysis and model debug may be performed offline on a separate system or distributed among several systems. Note also that some of the statistical inferences involved may be determined by fuzzy logic or neural networks so that the word "automated" is not restricted to sequential execution of computer instructions (Fig.1, Col.6, line 60-Col.7, line 7). The test suite may be evaluated for overall accuracy by analysis of historical data (FIG. 1, 126). For example, the system could compute the mutual information (or other statistical or information theoretic measures) between the model-based diagnosis and the distribution of TFC's recorded in the database (Col.9, lines 14-19). Booth et al. disclose a method of identifying improvements to a test suite in diagnosability analysis, the test suite based on a model of a system, the method comprising automatically identifying components, the failure of which has a probability of detectability by the test suite (Col.8, lines 15-31, Col.13, lines 59-65). The debug of the model based on incorrect diagnoses (Col.9, lines 33-34). Historical data may be used in conjunction with the model-based diagnostic system: providing cases for performance evaluation of the model-based system; allowing evaluation of the effect of changes suggested by debugging on overall performance (Col.11, lines 50-60). This feature is seen to be an inherent

teaching evaluating a diagnostic efficacy of the test suite using a probability of one or both of a correct diagnosis and incorrect diagnosis by the test suite as intended.

The rejection of claim 2

In response to Appellants' argument that "Booth et al. do not contain any teaching or suggestion evaluating a diagnostic efficacy of the test suite using a probability of one or both of a correct diagnosis and incorrect diagnosis by the test suite" (Appeal Brief, page 10, paragraph 4), the examiner disagrees. Booth et al. teach an automated analysis and troubleshooting system is provided that identifies potential problems with the test suite (ability of the model to detect and discriminate among potential faults), and also identifies probable modeling errors based on incorrect diagnoses (Col.5, lines 36-40). Booth et al. teach step of evaluating a diagnostic efficacy of the test suite (e.g. Col.9, lines 14-15) using a probability of one or both of a correct diagnosis and incorrect diagnosis (failure probability term) by the test suite (e.g. a probability of detectability by the test suite, Col.11, lines 15-18, lines 24-29, Col.13, line 64).

The rejection of claim 3

In response to Appellants' argument that "Booth et al. do not contain any teaching or suggestion determining a probability of a correct diagnosis and a probability of an incorrect diagnosis for the test suite using the database; and creating a list of suggested tests from the determined probabilities" (Appeal Brief, page 11, paragraph 5), the examiner disagrees. Booth et al. teach a test comprises: creating a simulation database 124 of the test suite; determining a

probability of a correct diagnosis (e.g. Col.6, lines 49-54) and a probability of an incorrect diagnosis for the test suite using the database (e.g. Col.9, lines 33-61); and creating a list of suggested tests from the determined probabilities (e.g. Col.10, line 66-Col.11, line 35).

The rejection of claim 4

In response to Appellants' argument that "Booth et al. do not contain any teaching or suggestion determining a probability of a correct diagnosis and a probability of an incorrect diagnosis for the test suite using the database; and creating a list of suggested tests from the determined probabilities" (Appeal Brief, page 12, paragraph 3), the examiner disagrees. Booth et al. teach determining a probability of a correct diagnosis (e.g. Col.6, lines 49-54) and a probability of an incorrect diagnosis for the test suite using the database (e.g. Col.9, lines 33-61); and creating a list of suggested tests from the determined probabilities (e.g. Col.10, line 66-Col.11, line 35), each suggested test on the list comprises test coverage (e.g. Col.11, lines 29-31).

The rejection of claim 6

In response to Appellants' argument that "Booth et al. do not contain any teaching or suggestion evaluating a diagnostic efficacy of the test suite using a probability of one or both of a correct diagnosis and incorrect diagnosis by the test suite; and identifying a test to delete from the test suite, the deletable test having a minimal effect on an overall diagnostic efficacy of the test suite" (Appeal Brief, page 13, paragraph 2), the examiner disagrees. Booth et al. teach evaluating a diagnostic efficacy of the test suite (e.g. Col.9, lines 14-15) using a

probability of one or both of a correct diagnosis and incorrect diagnosis (failure probability term) by the test suite (e.g. a probability of detectability by the test suite, Col.11, lines 15-18, lines 24-29, Col.13, line 64); and identifying a test to delete from the test suite, the deletable test having a minimal effect on an overall diagnostic efficacy of the test suite (e.g., if an incorrect diagnosis is made, the automated analysis system identifies ways of changing the rank order of diagnoses, including coverages that can be reduced and identification of operation violations that can be eliminated, Abstract).

The rejection of claim 11

In response to Appellants' argument that "Booth et al. do not contain any teaching or suggestion creating a simulation database of test suite; determining a probability of one or both of a correct diagnosis and incorrect diagnosis for the test suite using database" (Appeal Brief, page 14, paragraph 6), the examiner disagrees. Booth et al. teach the test suite analysis 116 and model debug analysis 120 can be used with simulated data 124 (Col.6, lines 52-54). Either simulated data (FIG. 1, 124) or historical TFC data (FIG. 1, 126) may be used for such analysis. If failure distribution information is available, the simulated failures may be created accordingly (Col.9, lines 4-8). Although Booth et al. do not specifically disclose the claimed creating a simulation database of test suite, this feature is seen to be an inherent teaching of that step since the test suite analysis 116 can be used with simulated data 124 (Col.6, lines 52-54). Booth et al. disclose the simulated data (FIG. 1, 124) may be used for such analysis. If failure distribution information is available, the simulated failures may be created

accordingly (Col.9, lines 4-8) that some type of creating a simulation database of test suite must be present for determining probability of one or both a correct diagnosis and an incorrect diagnosis for the test suite as intended. Booth et al. teach step of determining a probability of one or both a correct diagnosis and an incorrect diagnosis for the test suite using the database (e.g. Col.11, lines 15-18, lines 27-29); using the determined a probability to evaluate the test suite (e.g. Col.9, lines 14-15).

The rejection of claim 32

In response to Appellants' argument that "Booth et al. do not contain any teaching or suggestion a computer program stored in the memory and executed by the processor, wherein the computer program comprises instructions that, when executed by the processor, implement evaluating the test suite using a probability of one or both a correct diagnosis and an incorrect diagnosis by the test suite to determine the efficacy." (Appeal Brief, page 27, paragraph 3), the examiner disagrees. Booth et al. teach the test system 100, the model based diagnostic system 106, test suite analysis 116 and model debug 120 are all typically computer or processor based. That is, software is executed by a processor within an automated test system or the test system is controlled by a separate computer. In general, the test suite analysis 116 and model debug 120 can be performed by a processor or computer used for the test system 100 or used for the model based diagnostic system 106. Alternatively, test suite analysis and model debug may be performed offline on a separate system or distributed among several systems. Note also that some of the statistical

inferences involved may be determined by fuzzy logic or neural networks so that the word "automated" is not restricted to sequential execution of computer instructions (Fig.1, Col.6, line 60-Col.7, line 7). The test suite may be evaluated for overall accuracy by analysis of historical data (FIG. 1, 126). For example, the system could compute the mutual information (or other statistical or information theoretic measures) between the model-based diagnosis and the distribution of TFC's recorded in the database (Col.9, lines 14-19). Booth et al. disclose a method of identifying improvements to a test suite in diagnosability analysis, the test suite based on a model of a system, the method comprising automatically identifying components, the failure of which has a probability of detectability by the test suite (Col.8, lines 15-31, Col.13, lines 59-65). The debug of the model based on incorrect diagnoses (Col.9, lines 33-34). Historical data may be used in conjunction with the model-based diagnostic system: providing cases for performance evaluation of the model-based system; allowing evaluation of the effect of changes suggested by debugging on overall performance (Col.11, lines 50-60). This feature is seen to be an inherent teaching a computer program stored in the memory and executed by the processor, wherein the computer program comprises instructions that, when executed by the processor, implement evaluating the test suite using a probability of incorrect diagnosis by the test suite to determine the efficacy as intended.

The rejection of claim 33

In response to Appellants' argument that "Booth et al. do not contain any teaching or suggestion the instructions that evaluate the test suite comprise one

or both of suggesting a test to add to the test suite, and identifying a test to delete from the test suite" (Appeal Brief, page 8, paragraph 2), the examiner disagrees. Booth et al. disclose an automated analysis system that identifies detectability problems, diagnosability problems, and possible ways to change rank order of diagnoses in a diagnostic system and makes the problems and possible improvements visible to test programmers to aid in test improvement. Components that have no coverage and components that have inadequate coverage (according to a heuristic criteria) are identified as potential detectability problems. Components that are exercised by identical operations in all tests are identified as diagnosability problems. If an incorrect diagnosis is made, the automated analysis system identifies failing tests that have no coverage of any component in the true failure cause. In addition, if an incorrect diagnosis is made, the automated analysis system identifies ways of changing the rank order of diagnoses, including coverages that can be reduced and identification of operation violations that can be eliminated or deliberately added (Abstract). This feature is seen to be an inherent teaching the instructions that evaluate the test suite comprise one or both of suggesting a test to add to the test suite, and identifying a test to delete from the test suite as intended.

The rejection of claim 34

In response to Appellants' argument that "Booth et al. do not contain any teaching or suggestion creating a simulation database of the test suite; determining a probability of one or both of a correct diagnosis and an incorrect diagnosis using the database; and using the determined probability to evaluate

the test suite." (Appeal Brief, page 17, paragraph 4, page 18, paragraphs 3-4), the examiner disagrees. Booth et al. teach the test suite analysis 116 and model debug analysis 120 can be used with simulated data 124 (Col.6, lines 52-54). Either simulated data (FIG. 1, 124) or historical TFC data (FIG. 1, 126) may be used for such analysis. If failure distribution information is available, the simulated failures may be created accordingly (Col.9, lines 4-8). Although Booth et al. do not specifically disclose the claimed creating a simulation database of test suite, this feature is seen to be an inherent teaching of that step since the test suite analysis 116 can be used with simulated data 124 (Col.6, lines 52-54). Booth et al. disclose the simulated data (FIG. 1, 124) may be used for such analysis. If failure distribution information is available, the simulated failures may be created accordingly (Col.9, lines 4-8) that some type of creating a simulation database of test suite must be present for determining probability of one or both a correct diagnosis and an incorrect diagnosis for the test suite as intended. Booth et al. teach step of determining a probability of one or both a correct diagnosis and an incorrect diagnosis for the test suite using the database (e.g. Col.11, lines 15-18, lines 27-29); using the determined a probability to evaluate the test suite (e.g. Col.9, lines 14-15).

The rejection of claim 35

In response to Appellants' argument that "Booth et al. do not contain any teaching or suggestion using the determined probability of both a correct diagnosis and an incorrect diagnosis comprises creating a list of suggested tests to add to the test suite, each suggested test having an associated test coverage"

(Appeal Brief, page 8, paragraph 2), the examiner disagrees. Booth et al. teach determining a probability of a correct diagnosis (e.g. Col.6, lines 49-54) and a probability of an incorrect diagnosis for the test suite using the database (e.g. Col.9, lines 33-61); each suggested test having an associated test coverage (e.g. Col.11, lines 29-31).

B. The appellants have argued, regarding the 35 U.S.C. 102(b) rejection of claims 5, 7, 10, and 36 as anticipated by Booth et al. (US 5,922,079), regarding the 35 U.S.C. 103(a) rejection of claims 8 and 31 as being unpatentable over Booth et al. (USP 5,922,079) in view of Kanevsky et al. (USP 6,167,352), and regarding the 35 U.S.C. 103(a) rejection of claim 38 as being unpatentable over Booth et al. (USP 5,922,079) in view of Preist et al. (USP 5,808,919). The examiner agrees with the arguments. Therefore, the rejection of claims 5, 7, 8, 10, 31, and 38 under Booth, Kanevsky et al.,and Preist et al. are withdraw.

CONCLUSION:

For the above reasons, it is believed that the rejections should be sustained.

An appeal conference responsive to the reply brief was held on 09/29/2005 with Drew Dunn, SPE of AU 2872, and John E. Barlow, SPE of AU 2863.

Respectfully Submitted,

JL
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September 29, 2005

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Conference